WIRELESS LIGHT BEAM GUN

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The invention relates to a light beam gun device used with game players, more particularly, a wireless light beam gun device used with game player running shooting games; the wireless light beam gun device utilizes wireless transmission means, e.g., infrared (IR) or radio frequency (RF), to capture the blips on the screen or calculate the values of the blips on X and Y axes and then transmit back to the game player, thus increasing the space for users to move during shooting games, and the interaction and enjoyment for the user during the shooting game.

DESCRIPTION OF THE PRIOR ART

Recently for video shooting games, the common joysticks are often replaced by light beam guns for aiming at the targets on the screen, so as to simulate the reality in the games.

Based on the prior arts, the conventional wired light beam guns, in accordance with the ways of the gaming software design run by game players, are categorized into the first-generation wired light beam gun, wherein the axis value of the aiming points from the light beam gun can be calculated by the accordance between the game player and the gaming software itself; and the second-generation wired light beam gun, wherein the axis value of the aiming points are to be calculated first by the light beam gun device, and then the axis value is to be transmitted back to the game player. Please refer to Fig. 1, which shows the block diagram of the first-generation wired light beam gun connecting to the game player. The signal cable of the first-generation wired light beam gun is directly connected to the joystick connector of the game player 1; when the user aims at an aiming point on the screen 2, the photosensor 5 will then receive the blip signal produced from the aiming point hit on the screen 2 by the electron of the cathode-ray tube of the television 2

first, and then transmit the captured blip signals back to the game player 1. The gaming software run by the game player 1 will be able to calculate the coordinates of the aiming point on the screen corresponding to the blip based on the blip signal in accordance with the video signal 10 of the game player 1. Furthermore, during the state of the game player 1 reading the data from the light beam gun, the communication interface 3 in the wired light beam gun can transmit the data from the button 9 back to the game player 1.

In addition, the design of the conventional second-generation wired light beam gun is to add a television video signal contact, thus the light beam gun, with the added contact, can utilize the HV_sync separator 7 to obtain the H_sync signal 212 or V_sync signal 211. Subsequently please refer to Fig. 2, which is the block diagram of the second-generation wired light beam gun connecting to the game player. The signal cable of the second-generation wired light beam gun, directly connected to the joystick connector of the game player 1, utilizes the HV_sync separator 7 to obtain the H_sync signal 212 as well as the V_sync signal 211; also the V_sync signal 211 can be used for resetting the Y coordinate counter 23, which is used for counting the numbers of the H_sync signal 212. When the photosensor 8 of the wired light beam gun receives the blip hit on the screen by the electron of the cathode-ray tube of the television 2 first, the photosensor 8 of the wired light beam gun is to keep the valued already counted by the Y coordinate counter 23 for Y data buffer 25 (which means that there already occurred several H_sync signals 212 in the period of time between resetting and reception of blips) until the arrival of the V_sync signal 211 obtained by the next video signal, and then the value stored in the Y data buffer 25 and the numbers counted by the Y coordinate counter are to be deleted.

On the other hand, the X coordinate data are to be decided by the period of time between any H_sync pulse wave to the next H_sync pulse wave, and the H_sync signal 212 is used for resetting X coordinate counter 22, which is used for counting pulse waves produced by a high-frequency clock oscillator 6. When the user aims at an aiming point on the screen, the photosensor 8 of the wired light beam gun then receives the blip signal hit on the screen by the electron of the cathode-ray tube of the television 2, and such blip signal is to keep the value counted by the X coordinate counter 22 for the X coordinate data buffer 24 until the game player has read the X coordinate data, and then the value stored in the X coordinate data buffer 24 is to be deleted (which

means there already occurred several pulses generated by the high-frequency clock in the period of time between deletion and reception of blip signals; in other words, it depends on the length of time between deletion and reception of blip signals). After procedures described above, the values of the aiming point corresponding to the X and Y coordinates are to be obtained by the wired light beam gun; thus the light beam gun, during the game player 1 reading data from the light beam gun, is to transmit the data of button 9 and the X and Y coordinates back to the game player 1.

From the description of the workings regarding the first and second generation wired light beam guns, it is to be noticed that, whenever light beam guns are to conduct signal processing or calculate the coordinates of the X and Y axes, signal cables are always required to connect the signal transmission between the light beam gun and the game player 1. Furthermore, during a shooting game, movement of the user is usually confined by the signal cable of the light beam gun, with the operating and stretching space of the user being limited; thus the user cannot fully enjoy the game, because the interaction between the user and the game and the overall enjoyment of the user are diminished.

SUMMARY OF THE INVENTION

In view of the drawbacks of the aforementioned prior arts, the invention provides a light beam gun, with a wireless transmitting device and a wireless receiving device to replace the signal cable of the conventional wired light beam gun, thus not only expanding the space for the user to move during the shooting game, but also increasing the interaction between the user and the shooting game and the overall enjoyment. As a result, the invention enables the user to fully enjoy the game, thus elevating the playability of the game.

The main object is to provide a wireless light beam gun device and method thereof, whereby the numbers of pulses of the V_sync signals from the video signals are first to be counted respectively at both the end of the wireless game player and the end of the wireless light beam gun, and then, based on the ratio of both numbers of pulses, the blip coordinate data are to be calculated in the cycle of video signals, or the blip signals generated at the end of the game player are to be reduced.

Another object of the invention is to provide a wireless light beam gun device and method thereof, whereby the parameter data of the video signal cycles are to be calculated, and then, based on the ratio of pulses of the video signals at both the end of the game player and the wireless light beam gun, the blip coordinate data are to be obtained.

Yet another object of the invention is to provide a wireless light beam gun, whereby the parameter needed for calculating the video signal cycles can be captured based on the V_sync signals.

Since the user, when using the conventional wired light beam gun during the shooting game, can only adjust the space for movement in accordance with the length of the signal cable of the light beam gun, without being able to make larger motions, thus diminishing the interaction between the user and the game player and the overall enjoyment, the invention therefore utilizes the wireless devices like infrared or radio frequency to replace the signal cables of the conventional light beam guns, comprising the device at the end of the game player and the device at the end of the light beam gun, wherein the device at the end of the game player receives the video signals on the screen, and then utilizes, by using the V_sync signals, the ratio value of the number of pulses counted respectively at both the end of the game player and the end of the light beam gun, to calculate the blip coordinate data in the video signal cycles, or reduce a blip signal; whereas the video signal cycles can be calculated in the wireless light beam gun through a set of parameter data. The wireless light beam gun of the invention can not only prolong the lifespan of usage for the light beam gun, but also enable the user to fully enjoy the shooting game, with the operation of the light beam gun being handy and dexterous for the user.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects and advantages of the present invention will become better understood with regard to the following description, appended claims and accompanying drawings that are provided only for further elaboration without limiting or restricting the present invention, where:

Fig. 1 shows a block diagram of the conventional first-generation wired light beam gun being used in shooting games;

Fig. 2 shows a block diagram of the conventional second-generation wired light beam gun used in shooting games;

Fig. 3A shows a wireless game player end device of the second-generation light beam gun of the invention, wherein the circuit block diagram for capturing parameter is contained;

Fig. 3B shows an circuit block diagram of the device at the end of the second-generation wireless light beam gun of the invention;

Fig. 4A shows another embodiment of the wireless game player end device of the second-generation light beam gun of the invention, wherein the circuit block diagram for capturing parameter is contained;

Fig. 4B shows an circuit block diagram for another embodiment of the wireless light beam gun end device of the second-generation light beam gun of the invention;

Fig. 5A shows a wireless game player end device of the first-generation wireless light beam gun of the invention, wherein the circuit block diagram containing gate circuit is included;

Fig. 5B shows a block diagram of the device at the end of the first-generation wireless light beam gun of the invention;

Fig. 6A shows another embodiment of the wireless game player end device of the first-generation light beam gun of the invention, wherein the circuit block diagram having gate circuit is contained;

Fig. 6B shows an circuit block diagram for another embodiment of the wireless light beam gun end device of the first-generation light beam gun of the invention;

Fig. 7A shows an circuit block diagram of the wireless game player end device of yet another embodiment of the second-generation wireless light beam gun

of the invention;

Fig. 7B shows an circuit block diagram of the wireless light beam gun end device of yet another embodiment of the second-generation wireless light beam gun of the invention;

Fig. 8A shows an circuit block diagram of the wireless game player end device of a further embodiment of the second-generation wireless light beam gun of the invention;

Fig. 8B shows an circuit block diagram of the wireless light beam gun end device of a further embodiment of the second-generation wireless light beam gun of the invention;

Fig. 9 shows an circuit block diagram of a further embodiment of the invention; and

Fig. 10 shows a circuit block diagram of a further embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention provides a method for calculating coordinates, used in the second-generation light beam gun to generate the blip coordinate data corresponding to the aiming point on a screen, and then output to a game player; such a wireless light beam gun comprises a wireless game player end device and a wireless light beam gun end device. The aforementioned method comprises:

Providing with a video signal to the wireless game player end device, for capturing the parameter data needed for calculating the video signal cycles;

Providing with an oscillator counting circuit of the wireless game player end, for counting the largest pulse number of the V_sync signals of the video signals;

Providing with an oscillator counting circuit on the wireless light beam gun end,

for counting the largest pulse number of the V_sync signals of the video signals; and

Calculating the blip coordinate data calculated from the video signal cycles by the parameter data out of the blip signals collected in the wireless light beam gun end device, according to the ratio for both the largest pulse number of the V_sync signals of both the wireless game player end device and the wireless light beam gun end device.

According to the method for calculating coordinates of the invention, please refer to Fig. 3A and 3B, which respectively show the circuit block diagram of the wireless game player end device and the wireless light beam gun end device of the second-generation light beam gun of the invention. In this embodiment of the invention, all the signal triggering is of the front edge triggering. When the game player end of the wireless light beam gun receives the video signal 10 transmitted from the game player 1 to television, PC CRT Monitor or CRT TV, it is to utilize the HV_sync separator 7 to extract out the V_sync signal 211 and the H_sync signal 212, and then utilizes the V_sync signal 211 to activate the M_Total counter 202; before activation, the game player end of the wireless light beam is to keep first the value counted by the M_Total counter 202 in the M_Total buffer 203. After activation, the M_Total counter 202 then begins to count the number of pulses generated by the high-frequency clock oscillator 6. In order for the calculating circuit to come up with more accurate numbers, the embodiment of the invention gives both the parameter capture circuit 207 and the M_Total counter 202 the same high-frequency clock oscillator 6. At this time the parameter capture circuit 207 is, according to both the V_sync signal 211 and the H_sync signal 212, to extract the four parameters needed for calculating the video signal cycles (the four parameters are the number of the horizontal scanlines, the width of the high H_sync signal, the width of the low H_sync signal and the width of the V_sync signal 211), and then store them, along with the value in the M_Total buffer 203, into the data buffer 206, followed by transmitting the aforementioned data, along with the modulated V_sync signal 211, to the wireless receiving device 5 of the wireless light beam gun end via the wireless transmitting device 4; after the light beam gun end has received the value from the data buffer 206 and the V_sync signal 211, the demodulated V_sync signal 104 is to be accordingly based to activate the s_Total counter 105, and then the M_Total buffer data decoder 103 is to be saved into the M_Total

buffer 203; before activating the s_Total counter 105, the wireless light beam gun end is to first keep the value counted by the s_Total counter 105 in the s_Total buffer 106. After being activated, the s_Total counter 105 then begins to count the pulses generated by the high-frequency clock oscillator 6. Before the V_sync signal 211 arrives, the photosensor 8, if receiving the blip on screen 2, is to save the value in the s_Total counter 105 into the S_Buffer 101. Since the number of pulses oscillated each time by the high-frequency clock oscillator 6 shall not be identical, when calculating the high-frequency clock between the game player end and the light beam gun end, a ratio calculation circuit is needed to convert the actual light pulse signal position latched by the game player end of the light beam gun. Take the invention as an example, the count value saved in the s_Total buffer 106 is not to be identical to the calculated value saved in the M_Total buffer, thus the light beam gun can obtain a ratio value by using the aforementioned parameters, s_Buffer, value of the M_Total buffer and the value of the s_Total buffer, via the ratio calculation circuit 112 as follows:

Ratio Value=s_Buffer*(M_Total buffer/s_Total buffer)...(1)

The aforementioned ratio value can be stored in the s_Buffer 102, and at this time the wireless light beam gun end can utilize the s_Buffer 102 and the four parameters (the number of the horizontal scanlines S, the width of the high H_sync signal T_H, the width of the low H_sync signal T_L and the width of the V_sync signal 211 T_C) received previously to calculate the actual coordinate value of the X and Y axes. Before describing in detail coordinates of the X and Y axes, a video time cycle T is to be defined first, which is comprised of the width of the V_sync signal 211 T_C, the number of the horizontal scanlines S, the width of the high H_sync signal T_H, and the width of the low H_sync signal T_L. Because the video time cycle T of the game player 1 is to be fixed at the production stage, the coordinate values of the X and Y axes can be calculated by the calculation circuit 108 of the X and Y axes 108 and then save the coordinate value into the data buffer of the X and Y axes 110 and 109, which is to be presented as follows:

$$(s\_Buffer\ 1 - T_C)/(T_H + T_L) = Y \ldots\ldots\ldots\ldots\ldots R(\text{remainder})$$

$$R - T_H = X \ldots\ldots\ldots\ldots\ldots (2)$$

Wherein $T_H < T_L$

Through the aforementioned procedure, the data of the X and Y axles can be obtained. And then the wireless light beam gun end, under the means of the encoding/packaging unit 111, is to wirelessly transmit the data of the X and Y axles, along with the state of the button 9, to the game player end of the wireless light beam gun. Afterwards the game player end of the wireless light beam gun, after demodulating and decoding, can communicate with the game player under the communication format of the game player 1.

Please continue refer to Fig. 3A and Fig. 3B, wherein the wireless light beam gun end device shown in Fig. 3A comprises an HV_sync separator 7, used for extracting out the V_sync signal 211 and the H_sync signal 212 from the video signal 10, and the V_sync signal 211 obtained can be used for activating the M_Total counter 202 and the S_Total counter 105; a V_sync modulator circuit 201, used for modulating the V_sync signal 211 so as to expedite the wireless transmission between the game player end and the light beam gun end; a parameter capture circuit 207, used for capturing the four parameters needed to calculate the coordinate value of the X and Y axes according to the aforementioned synchronized signals; an M_Total counter 202, used for counting the clocks oscillated by the high-frequency clock oscillator 6, and the contents in the M_Total counter 202 are not to be deleted until the next V_sync signal 211 arrives; an M_Total buffer 203, used for storing the value obtained by the M_Total counter 202 before being deleted; a data buffer 206, used for storing the four parameters extracted by the M_Total buffer 203 and the parameter capture circuit 207; a wireless transmitting device 4, used for transmitting the value in the data buffer 206 and the modulated V_sync signal 201 to the light beam gun end; whereas shown in Fig. 3B the wireless light beam gun end then comprises a demodulator circuit 204, which demodulates the data transmitted from the game player end of the light beam gun along with the high-frequency clock oscillator 61; a photosensor 8, used for sensing the blips on the screen and then generating pulse waves; an s_Total counter 105, used for counting the clocks oscillated by the high-frequency clock oscillator 6, and the contents in the s_Total counter 202 are not to be deleted until the next demodulated V_sync signal 104 arrives; before activating the s_Total counter 105 the wireless light beam gun end is to store the value counted by the s_Total counter 105 in the s_Total buffer 106. Before the next V_sync signal arrives, the photosensor 8,

if receiving the blip on screen 2, is to save the value in the s_Total counter 105 into the S_Buffer 101; an S_Total Buffer 106 is used to store the value counted by the S_Total counter 105 before being deleted; an M_Total buffer decoding circuit 103 is used for demodulating the value in the M_Total Buffer 203 transmitted from the game player end of the light beam gun; an M_Total Buffer 203 is used for storing the aforementioned demodulated value; an s_Buffer 101 is used for saving the value in the s_Total counter 105 into s_Buffer 101, if the photosensor 8 of the light beam gun receives blips on the screen 2; a ratio calculating circuit 112 is used for capturing the values in the s_Buffer 101, S_Total buffer 106 and the M_Total buffer 203, and then the converted value is to be stored in the s_Buffer 102 through the ratio formula(1); an X/Y calculating circuit 108 is used for calculating the accurate X and Y coordinates via the formula (2) by combining the value of the s_Buffer 1 102 and the four parameter values (the width of the V_sync signal 211 T_C, the number of the horizontal scanlines S, the width of the high H_sync signal T_H, and the width of the low H_sync signal T_L); the X and Y coordinate data buffer 109 and 110 are used to store the X and Y axle coordinate values calculated previously; an encoding/packaging unit 111 is then used for encoding the values in the X and Y coordinate data buffer 109 and 110 and the switch data with the means of packaging, and then a wireless transmitting device 4 is used for transmitting the encoded data to the game player end of the wireless light beam gun. Furthermore, the game player end of the wireless light beam gun further comprises a wireless receiving device 5 used for receiving the X and Y coordinate data and the data encoding data; a demodulator 204 is used for demodulating the data received by the wireless receiving device 5 through adding the high-frequency clock oscillator 6, and then an X/Y switch data decoder 205 is used for decoding the data demodulated previously. Therefore, the second-generation wireless light beam gun of the invention, based upon the synchronized signals separated by the video signal 10, utilizes the parameter capture circuit 207 to acquire the four parameter values needed for calculating X and Y axle coordinates, and then the four parameter values along with the values in the M_Total buffer 203 are to be simultaneously transmitted to the wireless light beam gun end to do the ratio calculation and the X and Y coordinate calculation, thus the X and Y coordinates are to be calculated, a process that is the primary characteristic of this embodiment of the invention.

Please continue refer to Fig. 4 and Fig. 5, which show the further embodiment

of the second-generation wireless light beam gun of the invention, wherein the light beam gun still includes the wireless light beam gun end device and the game player end device, with the game player end device of the light beam gun further receiving the values of the s_Total buffer 106 and the s_Buffer 101 of the light beam gun end, so as to implement the ratio calculating circuit 112 and the X/Y calculating circuit 108. In this embodiment of the invention, when the photosensor 8 of the wireless light beam gun end receives the blips on the screen 2, the s_Total counter 105 is to save the values counted into the s_Buffer 101, and then encode the values inside the s_Total Buffer 106 and the encoded switch data together and transmit to the game player end of the wireless light beam gun, and when the game player end of the light beam gun receives the encoding data, such encoded data are to first be through the circuits of demodulator 204 and the decoder 208, and through the ratio calculating circuit 112, along with the values in the M_Total buffer 203, thus acquiring a ratio value that is to be save in the M_Buffer 209 which, along with the four parameter values captured by the parameter capture circuit 207, is to be transmitted to the X/Y calculating circuit 108 to convert the coordinates, with the result of which saved in the X/Y data buffer 110 and 109 to communicate with the game player via communication interface 3.

Please continue refer to Fig. 4A and 4B, wherein the game player end device of the wireless light beam gun in Fig. 4A, apart from the primary components in Fig. 3A, further includes an encoding circuit 208, used for encoding the s_Total buffer 106, s_Buffer 101 and the switch data; a ratio calculation circuit 112, used for calculating a ratio value from the s_Total buffer 106, s_Buffer 101 and the M_Total buffer 203 according to the ratio formula (1); an M_Buffer 209, used for saving the ratio value calculated by the ratio calculation circuit 112; an X/Y calculating circuit 108, used for calculating the accurate values of the X/Y coordinates from the four parameter values captured by the parameter capturing circuit 207 and the ratio value saved in the M_Buffer 209 via the calculation formula (2); and an X/Y data buffer 110 and 109, used for saving the X/Y coordinate values calculated previously. The light beam gun end in Fig. 4B then includes a demodulating circuit 104, used for demodulating the V_sync signal 201 transmitted from the game player end of the light beam gun with the addition of the high-frequency clock oscillator 61; a photosensor 8, used for sensing the blips on the screen 2 to produce pulses; an s_Total counter 105, used for counting the clock oscillated by the high-frequency clock oscillator 61, and the values counted by the

s_Total counter 105 are not to be deleted until the arrival of the V_sync signal 211 after the next demodulation. Before the arrival of the V_sync signal 211, the photosensor 8 of the wireless light beam gun, if receiving the blips on the screen 2, shall immediately save the values in the s_Total counter 105 into the s_Buffer 101; an S_Total buffer 106, used for saving the values counted by the s_Buffer 105 before being deleted; an s_Total Buffer 106, used for saving the values in the s_Total counter 105 into the s_Buffer 101 as soon as the photosensor 8 of the light beam gun receives the blips on the screen 2; an encoding/packaging unit 113, used for encoding the values in the s_Total buffer 106 and s_Buffer 101 along with the switch data with the means of packaging; and a wireless transmitting device 4, used for transmitting said packaging to the game player end of the wireless light beam gun. Therefore, the embodiment of the invention is to set up both the ratio calculation circuit 112 and the X/Y calculation circuit 108 inside the game player end of the wireless light beam gun, thus when the photosensor 8 of the light beam gun end receives the blip signals, the procedures needed are only to save the values counted by the s_Total counter 105 into the s_Buffer 101, and such values are, along with the s_Total buffer 106, transmitted to the game player end of the wireless light beam gun to do ratio calculation and the X and Y coordinate calculation, thus acquiring the accurate X and Y coordinates, a process that is the primary characteristic of this embodiment of the invention.

The invention provides a signal producing means, used in the first-generation wireless light beam gun, wherein the blip signal relative to the aiming point is produced to output to a game player; such a wireless light beam gun comprises a wireless game player end device and a wireless light beam gun end device. The aforementioned method comprises:

Providing with a video signal to the wireless game player end device, and separating and acquiring the V_sync signal;

Providing with an oscillator counting circuit of the wireless game player end, for counting the largest pulse number of the V_sync signals of the video signals;

Providing with an oscillator counting circuit of the wireless light beam gun end, for counting the largest pulse number of the V_sync signals of the video signals;

Calculating the ratio for the blip signal connected by the wireless light beam gun end device producing the blip signal in the video signal cycles, according to the ratio for both the largest pulse number of the V_sync signals of both the wireless game player end device and the wireless light beam gun end device; and

Producing a reducing blip signal in said video signal cycles and outputting to said game player, according to said ratio of producing the blip signal in the video signal cycles.

According to the method for producing signals of the invention, please refer to Fig. 5A and 5B, which respectively show the circuit block diagram of the wireless game player end device and the wireless light beam gun end device of the first-generation light beam gun of the invention. In this embodiment of the invention, all the signal triggering is of the front edge triggering. When the game player end of the wireless light beam gun receives the video signal 10 transmitted from the game player 1 to television, PC CRT Monitor or CRT TV 2, it is to utilize the HV_sync separator 7 to extract out the V_sync signal 211 and the H_sync signal 212, and then utilizes the V_sync signal 211 to activate the M_Total counter 202; before activation, the game player end of the wireless light beam is to keep first the value counted by the M_Total counter 202 in the M_Total buffer 203. After activation, the M_Total counter 202 then begins to count the number of pulses generated by the high-frequency clock oscillator 6. Then the values of the M_Total buffer 203 are to be saved in the data buffer 206, followed by transmitting the aforementioned data, along with the modulated V_sync signal 211, to the wireless receiving device 5 of the wireless light beam gun end via the wireless transmitting device 4; after the light beam gun end has received the value from the data buffer 206 and the V_sync signal 211, the demodulated V_sync signal 104 is to be accordingly based to activate the s_Total counter 105, and then the M_Total buffer data decoder 103 is to be saved into the M_Total buffer 203; before activating the s_Total counter 105, the wireless light beam gun end is to first keep the value counted by the s_Total counter 105 in the s_Total buffer 106. After being activated, the s_Total counter 105 then begins to count the pulses generated by the high-frequency clock oscillator 6. Before the V_sync signal 211 arrives, the wireless light beam gun, if receiving the blip on screen 2, is to save the value in the s_Total counter 105 into the

S_Buffer 101. Thus the light beam gun can obtain the s_Buffer 1 by using the aforementioned parameters, s_Buffer, value of the M_Total buffer and the value of the s_Total buffer, via the ratio calculation circuit 112 as follows:

s_Buffer 1=s_Buffer*(M_Total buffer/s_Total buffer)...(1)

After acquiring the value the s_Buffer 1 102, the wireless light beam gun end is to transmit such value, along with the switch data, to the game player of the wireless light beam gun via the wireless transmitting device 4; when the game player end of the wireless light beam gun receives the data transmitted from the light beam gun end, the demodulator 204 is used for demodulating such data and then the value of the first-level buffer of the game player end s_Buffer 214 is to be saved in the second-level buffer, and then the value of the s_Buffer 214 transmitted from the light beam gun end is to be saved in the first-level buffer of the s_Buffer 1 214 of the game player end. At this time the second-level buffer of the s_Buffer 1 214 the values counted by the M_Total counter 202 are to be transmitted to the Gate 213, and as soon as the value counted by the M_Total counter 202 is identical to that in the second-level s_Buffer 214, the M_Total counter 202 is to output a high electric-potential signal to the pulse generator 215 so as to reduce and produce a light pulse and then directly output to the game player 1.

Please continue refer to Fig. 5A and Fig. 5B, wherein the game player end of the wireless light beam gun in Fig. 5A, apart from comprising a part of the primary components in Fig. 3A (like HV_sync separator 7, M_Total counter 202, M_Total Buffer 203, modulator circuit 201, demodulator circuit 204 and the data buffer 214), further includes an s_Buffer 1 buffer 214 having the second-level buffer assembly, wherein the first-level buffer is used for saving the ratio value of the transmission from the light beam gun end to the game player end of the light beam gun, whereas the second-level buffer is used for saving the value saved by the first-level buffer of the previous picture. When receiving the data transmitted from the light beam gun end (s_Buffer 1 and the switch data), the value of the first-level buffer is to be saved in the second-level buffer first, and then the value of the s_Buffer 1 is to be saved in the first-level buffer; a gate circuit 213, which is a member similar to a logical gate circuit; when signals from the input end arrive, such circuit is to do the Boolean algebraic calculation on signals from the input end, and then output a pulse signal to the pulse generator 215. To take the invention for example,

the values of the M_Total counter 202 in the game player end of the light beam gun and of the second-level buffer of the s_Buffer 214 are to be directly transmitted to the gate circuit 213, so not until the value counted by the M_Total counter 202 is identical to that in the second-level s_Buffer 214 does the gate circuit 213 begin to output a high electric-potential (pulse) to the pulse generator 215; otherwise the output of the gate circuit 213 is constantly to be in the state of low electric potential. The output truth table of the gate circuit 213 is similar to that of the ordinary XOR (exclusive or gate) logical gate member; a pulse generator 215, used for reducing and generating a light pulse and directly output to the game player 1 according to the output of the gate circuit 213. Whereas the wireless light beam gun in Fig. 5B includes a V_sync demodulator 104, used for demodulating the V_sync signal 211 transmitted from the game player end of the light bean gun adding the high-frequency clock oscillator 6; a photosensor 8, used for sensing blips on the screen 2 to produce pulses; an s_Total counter 105, used for counting the clock oscillated by the high-frequency clock oscillator 61, and the s_Total counter 105 keeps counting until the arrival of the next V_sync signal 211, and then the value counted is to be deleted; before deletion of the value counted, the wireless light beam gun end is to save the value counted by the s_Total counter 105 in the s_Total buffer 106. Before the arrival of the next V_sync signal 211, the photosensor 8 of the wireless light beam gun, if receiving blips on the screen 2, is immediately to save the value in the s_Total counter 105 in the s_Buffer 101; an S_Total buffer 106, used for saving the value counted by the s_Total counter 105 before deletion; an M_Total buffer decoding circuit 103, used for demodulating the value in the M_Total buffer 203 transmitted from the game player end of the light beam gun; an M_Total buffer 203, used for saving the demodulated value; an s_Buffer buffer 101 used for saving the value in the s_Total counter 105 in the s_Buffer 101 as soon as the photosensor 8 of the light beam gun receives blips on the screen 2; a ratio calculation circuit 112, used for capturing the values in the s_Buffer 101, S_Total buffer 106 and the M_Total buffer 203, and then convert the values through the ratio formula (1) and save in the s_Buffer 1 102; an s_Buffer 1 buffer 102, used for saving the ratio value converted by the ratio calculation circuit 112; a buffer 114, used for saving the switch output data and the value in the s_Buffer 1 buffer 102 and such data and value are to be transmitted by the wireless transmitting device to the game player end of the wireless light beam gun. Therefore, the first-generation wireless light beam gun is to utilize a gate circuit 213 as preamp input member, thus when the wireless light beam

gun end receives the blip signal and does the ratio calculation with other parameters (s_Buffer, S_Total buffer and M_Total buffer), such ratio value is to be transmitted back to the game player end of the light beam gun; at this time the M_Total counter 202 of the game player end, after being deleted by the V_sync signal 211, is to continuously count the pulses oscillated by the high-frequency clock oscillator 6, until the value counted is identical to that in the second-level buffer of the s_Buffer 214, and the gate circuit 213 is to output a high electric potential to the pulse generator 215 to reduce the blip signal to the game player 1, a process that is the primary characteristic of the invention.

Please continue refer to Fig. 6A and 6B, which are the block diagrams of the further embodiment of the first-generation wireless light beam gun of the invention. In this embodiment, the game player device of the light beam gun further receives the values of the s_Total buffer 106 and the s_Buffer 101 to implement the ratio calculation circuit 112 and reduce the blip signals. In the invention, after the game player end of the wireless light beam gun has transmitted the modulated V_sync signal 211 to the wireless light beam gun end, the light beam gun end is to activate the s_Total counter 105 according to the demodulated V_sync signal 211 adding the high-frequency clock 6; yet before the activation of the s_Total counter 105 the value in the s_Total counter 105 is to be saved first in the s_Total buffer 106 by the wireless light beam gun end. The s_Total counter 105, after being activated, is to count the pulses oscillated by the high-frequency clock oscillator 61, and before the arrival of the next V_sync signal 211, the wireless light beam gun, if receiving blips on the screen 2, is immediately to save the value in the s_Total counter 105 in the s_Buffer 101, and form a package 113 along with the s_Total buffer 106 and the encoded switch data. Such package is then transmitted to the game player end of the light beam gun. And when the game player end of the wireless light beam gun receives such package, it is to be through the demodulator 204 and the decoding circuit 208 and be inputted, along with the value in the M_Total buffer 203 to the ratio calculation circuit 112. And then after being calculated by using the ratio formula (1), the converted ratio value is to be saved in the M_Buffer 209. At this time when the value counted by the M_Total counter 202 is identical to that in the M_Buffer 209, a high electric-potential pulse is to be outputted to the pulse generator 215 to reduce the blip signal and directly outputted to the game player end 1.

Please continue refer to Fig. 6A and 6B, wherein the wireless light beam gun device shown in Fig. 6B is identical to that shown in Fig. 4B, and the game player end device of Fig. 6A further includes an HV_sync separator 7, used for extracting the V_sync signal 211 and the H_sync signal 212 from the video signal 10, and the extracted V_sync signal 211 can be used for activating M_Total counter 202 and the S_Total counter 105; a V_sync modulator 201, used for modulating the V_sync signal 211, so as to expedite the wireless transmission between the light beam gun end and the game player end of the light beam gun; an M_Total counter 202, used for continuously counting the clock oscillated by the high-frequency clock oscillator 6 until the arrival of the next V_sync signal 211, and then the value in the M_Total counter 202 is to be deleted; an M_Total buffer 203, used for saving the value counted in the M_Total counter 202 before being deleted, a demodulator 204, used for demodulating the data transmitted from the light beam gun end adding the high-frequency clock 61; a ratio calculation circuit 112, used for capturing the values in the s_Buffer 101, the S_Total buffer 106 and the M_Total buffer 203, and converting such values via the ratio formula (1) and save the converted values in the M_Buffer 209; an M_Buffer 209, used for saving the ratio values calculated by the ratio calculation circuit 112; a gate circuit 213, which is a member similar to a logical gate circuit, when signals are inputted from the inputting end, the gate circuit 213 is to do the Boolean algebraic calculation on such inputting signals, and then output a pulse signal to the pulse generator 215; a pulse generator 215, used for reducing and producing a light pulse and directly output to the game player 1 according to the output from the gate circuit 213. Therefore, the first-generation wireless light beam gun of this embodiment of the invention sets up a ratio calculation circuit 112 and a gate circuit 213 at the game player end of the light beam gun, thus when the light beam gun end receives blip signals, it is to transmit the values in the s_Total buffer 106 and the s_Buffer 101 to the game player end of the light beam gun, and utilize the ratio calculation circuit 112 and the gate circuit 213 to drive the pulse generator 215 to reduce and output a blip signal to the game player 1, a process that is the primary characteristic of this embodiment.

Please refer to Fig. 7A and 7B, which are the block diagrams of the light beam gun end device and the game player end device of the wireless light beam gun of the invention, wherein when the game player end of the wireless light beam gun receives the video signal 10 transmitted from the game player 1 to television, PC CRT Monitor or CRT TV 2, it is to utilize the HV_sync separator

7 to extract out the V_sync signal 211 and the H_sync signal 212; then the H_sync signal 212 can be used for activating the X axle counter, and the V_sync signal 211 is used for activating the M_Total counter 202 and the Y axle counter. Before activation, the game player end of the wireless light beam is to keep first the value counted by the M_Total counter 202 in the M_Total buffer 203. After activation, the M_Total counter 202 then begins to count the number of pulses generated by the high-frequency clock oscillator 6. Then the values of the M_total buffer 203 are to be saved in the data buffer 206, followed by transmitting the aforementioned data, along with the modulated V_sync signal 211, to the wireless receiving device 5 of the wireless light beam gun end via the wireless transmitting device 4; after the light beam gun end has received the value from the data buffer 206 and the V_sync signal 211, the demodulated V_sync signal 104 is to be accordingly based to activate the s_Total counter 105, and then the M_Total buffer data decoder 103 is to be saved into the M_Total buffer 203; before activating the s_Total counter 105, the wireless light beam gun end is to first keep the value counted by the s_Total counter 105 in the s_Total buffer 106. After being activated, the s_Total counter 105 then begins to count the pulses generated by the high-frequency clock oscillator 6. Before the next V_sync signal 211 arrives, the wireless light beam gun, if receiving the blip on screen 2, is to save the value in the s_Total counter 105 into the S_Buffer 101. Thus the light beam gun can obtain the s_Buffer 1 by using the aforementioned parameters (s_Buffer, values in both the M_Total buffer and the s_Total buffer) via the ratio calculation circuit 112 as follows:

s_Buffer 1=s_Buffer*(M_Total buffer/s_Total buffer)...(1)

After acquiring the value the s_Buffer 1 102, the wireless light beam gun end is to transmit such value, along with the switch data, to the game player of the wireless light beam gun via the wireless transmitting device 4; when the game player end of the wireless light beam gun receives the data transmitted from the light beam gun end, the demodulator 204 is used for demodulating such data and then the value of the first-level buffer of the game player end s_Buffer 214 is to be saved in the second-level buffer, and then the value of the s_Buffer 214 transmitted from the light beam gun end is to be saved in the first-level buffer of the s_Buffer 1 214 of the game player end. At this time the second-level buffer of the s_Buffer 1 214 the values counted by the M_Total counter 202 are to be transmitted to the Gate 213, and as soon as

the value counted by the M_Total counter 202 is identical to that in the second-level s_Buffer 214, it is to output a high electric-potential signal so as to latch the X/Y data buffer that contains the counting values from the X/Y axle counter of the game player end of the light beam gun; at this time the values in the X/Y data buffer are the actual X/Y coordinates, which are to be outputted, along with the decoded switch data, to the game player.

Please continue refer to Fig. 7A and 7B, wherein the embodiment of the wireless light beam gun end device is identical to that of the wireless light beam gun end device shown in Fig. 5B, and the game player end device in Fig. 7A not only includes parts of the primary components (not including the pulse generator), but also includes an X axle counter, used for counting the number of the high-frequency clocks 61, and conducting the activation motion temporarily when the next H_sync signal arrives; a Y axle counter, used for counting the number of the H_sync signals, and conducting the activation motion temporarily when the next H_sync signal arrives; and an X/Y data buffer, used for saving the values counted by the X/Y axle counter.

When the user aims at an aiming point on the screen, the photosensor 8 of the wireless light beam gun end is to receive the blip signal produced from the aiming point hit on the screen 2 by the electron of the cathode-ray tube of the television 2 first, and then such signal is to latch the value counted by the s_Total counter 105 at this time in the s_Buffer 101; after being through the ratio calculation circuit, the data is to be transmitted to the game player end of the light beam gun; and after decoding and demodulating, the game player end of the light beam gun is to utilize the gate circuit to reduce the blip signal and latch the value counted by the X/Y axle counter in the X/Y data buffer. Lastly the value in the data buffer and the decoded switch data are both outputted to the game player, a process that is the primary characteristic of this embodiment.

Please refer to Fig. 8A and 8B, which are the block diagrams of the further embodiment of the second-generation wireless light beam gun of the invention, wherein the game player device of the light beam gun further receives the values of the s_Total buffer 106 and the s_Buffer 101 to implement the ratio calculation circuit 112 and reduce the blip signals. In the invention, after the game player end of the wireless light beam gun has transmitted the modulated V_sync signal 211 to the wireless light beam gun end, the light

beam gun end is to activate the s_Total counter 105 according to the demodulated V_sync signal 211 adding the high-frequency clock 6; yet before the activation of the s_Total counter 105 the value in the s_Total counter 105 is to be saved first in the s_Total buffer 106 by the wireless light beam gun end. The s_Total counter 105, after being activated, is to count the pulses oscillated by the high-frequency clock oscillator 61, and before the arrival of the next V_sync signal 211, the wireless light beam gun, if receiving blips on the screen 2, is immediately to save the value in the s_Total counter 105 in the s_Buffer 101, and such value, along with the s_Total buffer 106 and the encoded switch data, are all transmitted to the game player end of the light beam gun. When the game player end of the light beam gun receives said data, it is to be through the demodulator 204 and the decoding circuit 208 and be inputted, along with the value in the M_Total buffer 203 to the ratio calculation circuit 112. And then after being calculated by using the ratio formula (1), the converted ratio value is to be saved in the M_Buffer 209. At this time when the value counted by the M_Total counter 202 is identical to that in the M_Buffer 209, a high electric-potential pulse is to be outputted so as to latch the X/Y data buffer that contains the counting values from the X/Y axle counter of the game player end of the light beam gun; at this time the values in the X/Y data buffer are the actual X/Y coordinates, which are to be outputted, along with the decoded switch data, to the game player.

Please refer to Fig. 8A and 8B, wherein the embodiment of the wireless light beam gun end device shown in Fig. 8B is identical to that of the wireless light beam gun end device shown in Fig. 6B, and the game player end device in Fig. 8A not only includes parts of the primary components shown in Fig. 6A (not including the pulse generator), but also includes an X axle counter, used for counting the number of the high-frequency clocks 61, and conducting the activation motion temporarily when the next H_sync signal arrives; a Y axle counter, used for counting the number of the H_sync signals 212, and conducting the activation motion temporarily when the next H_sync signal arrives; and an X/Y data buffer, used for saving the values counted by the X/Y axle counter.

When the user aims at an aiming point on the screen, the photosensor 8 of the wireless light beam gun end is to receive the blip signal produced from the aiming point hit on the screen 2 by the electron of the cathode-ray tube of the television 2 first, and then such signal is to latch the value counted by the

s_Total counter 105 at this time in the s_Buffer 101; after being through the ratio calculation circuit, the data is to be transmitted to the game player end of the light beam gun; and after decoding and demodulating, the game player end of the light beam gun is to utilize the gate circuit to reduce the blip signal and latch the value counted by the X/Y axle counter in the X/Y data buffer. Lastly the value in the data buffer and the decoded switch data are both outputted to the game player, a process that is the primary characteristic of this embodiment.

Please refer to Fig. 9, which shows the block diagram of the further embodiment of the invention. The main characteristic of the invention is to replace several monitor synchronized-value calculating circuits like M_Total counter, M_Total buffer, S_Total counter and S_Total counter in the prior arts with a game player 1 that is capable of acquiring and controlling the synchronized values on the screen 2. Since all the pictures of the game are produced and controlled by the game player 1, the game player 1 can easily acquire the monitor related data 205 like M_Total and other horizontal synchronized values, and utilize the game-control interface to transmit the data to the game player end of the wireless light beam gun; at this time the game player end of the wireless light beam gun is to convert such data, by using the X/Y calculation circuit, so that the position of the blips are to be acquired and transmitted back to the game player 1.

Please continue refer to Fig. 9, wherein it is shown that the wireless light beam gun device of this embodiment comprises a V_sync modulator 201, used for modulating the V_sync signals; a game player 1, used for producing all the pictures of the game and acquire the related data 205 in the monitor; a communication interface 3, used for transmitting the related data 205 in the monitor to the ratio calculation circuit 112 to convert, so that the actual blip signal or the blip coordinates can be acquired; an X/Y calculation circuit, based upon the X/Y calculation formula as follows:

M_Buffer=S_Buffer* (M_Total/S_Total)

used for converting the related data 205 in the monitor into the blip coordinates; a demodulating circuit 204, used for demodulating data transmitted from the light beam gun end adding the high-frequency clock oscillator 6; a buffer and the S_Total/S_Buffer/switch data decoder 208, used